

## Topic 5: How to Run an Air Dispersion Analysis

For the purpose of health risk assessments, the dispersion analysis module allows a user to build and run an input file for the U.S. EPA air dispersion model ISCST3 (Industrial Source Complex – Short Term 3). In HARP, ISCST3 is run in combination with the U.S. EPA building downwash model BPIP (Building Profile Input Program). For more information on setting up a dispersion analysis, see Chapters 4 and 9 in the HARP User Guide.

### Prerequisite

Before you can run an air dispersion analysis, you must first add your emissions data into the CEIDARS-Lite emissions inventory database within HARP (See Topic 2 in the HARP How-To Guides for instructions). It is also necessary to set a default coordinate system (see Topic 1 in the HARP How-To Guides for information).

### Step 1. Opening the Dispersion Analysis Module

- From the HARP main menu, select **Analysis**.
  - If you have actual meteorological data that is representative of the location you are analyzing, use the dispersion module for representative met data; select **Dispersion Analysis (Representative Met Data)**.
  - If you are using screening meteorology data, select **Dispersion Analysis (Screening Met Data)**.

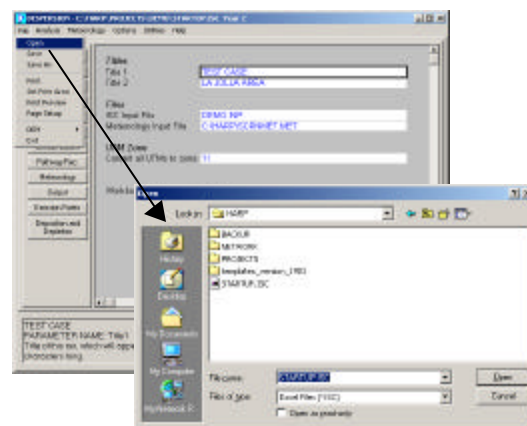


### Step 2. Opening a Dispersion Analysis Workbook

HARP will automatically open the last dispersion workbook used with your project directory. However, if there are no workbooks associated with your project directory, HARP will open a default workbook (STARTUP.ISC) in your project directory.

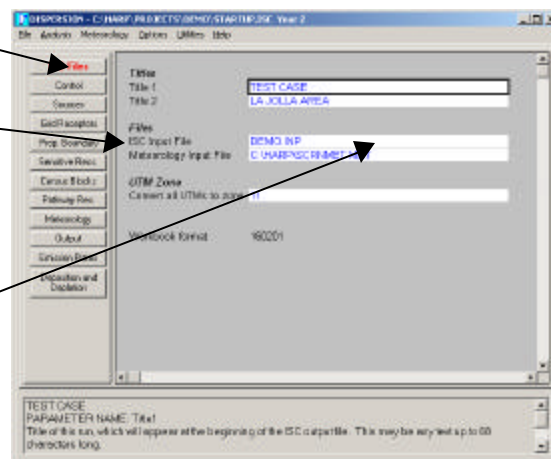


HARP will create a default workbook called "STARTUP.ISC" if there are no workbooks associated with your project directory



- Click on the **ISC Files** button on the left side of the Dispersion screen. Fill in the information for Titles, Files (e.g., meteorological input file), and UTM Zone (See Note 1). Then click **File/Save As** and save the file with a new name.

**Note 1:** All of the ISC input and output files created by HARP will have the same name as listed in the ISC Input File field. F2 will allow you to edit a cell without typing over the existing data.



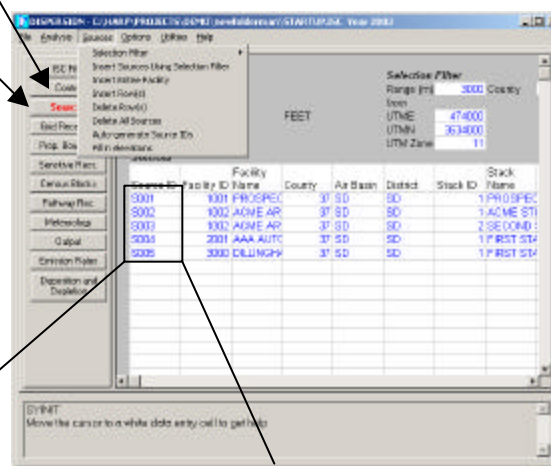
### Step 3. Setting Control Parameters

- To set the control parameters of how the analysis will be performed, click the **Control** button on the left side of the **Dispersion** screen. If you plan to use the regulatory defaults, then make no changes from the default settings.

**Note 2:** If your workbook was created from an existing workbook, it may contain existing facility data. You may need to clear this data before entering in the data for your analysis.

### Step 4. Defining Emission Sources

- Next you will need to define the emission sources and stack parameters. Click **Sources** button on the left side of the **Dispersion** screen.
- Clear the preset data in this section of the workbook by selecting **Sources/Delete All Sources** from the top menu (See Note 2).
- You may begin typing your data in manually or import it by clicking **Sources/Insert Entire Facility** from the top menu and pick a facility from the popup list (See Note 3).
- HARP can automatically generate the **Source ID** column for you. Using your mouse, highlight all cells that need identification tags. Click **Sources/Auto-generate Source IDs** from the top menu to generate source identification tags.
- Click **File/Save** to save the file.



To highlight the cells, click and hold the left mouse button and drag

**Note 3:** If you have already entered your facility data into the CEIDARS-Lite database, you may use the selection filter to import a group of facilities at one time from your database.

## Step 5. Defining Receptor Grid

The Grid Receptors worksheet is used to describe the locations of receptors on a Cartesian grid using a facility as the origin. To begin, click the **Grid Receptors** button on the left side of the Dispersion screen. If you wish to exclude grid receptors in the dispersion analysis, type "NO" into the **Include Grid** field.

1. Click on **Grid receptors/Set Origin to Facility** from the top menu. Then select a facility to center the grid around.
2. Next, set the grid parameters. This will be the size of your grid and the distance between each grid point. In the fields under **Grid Generation Parameters**, type in the minimum and maximum values for the north and east directions and the increments (See the illustration below for help with inputting).
3. Generate the grid by clicking **Grid receptors/Generate Grid** from the top menu. Finally, click **File/Save** from the top menu to save the file.

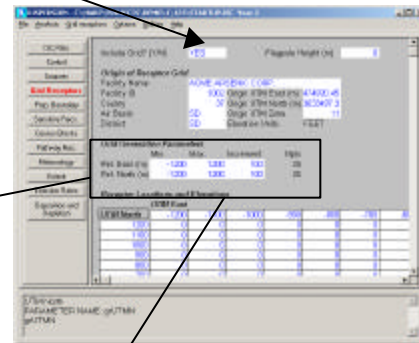
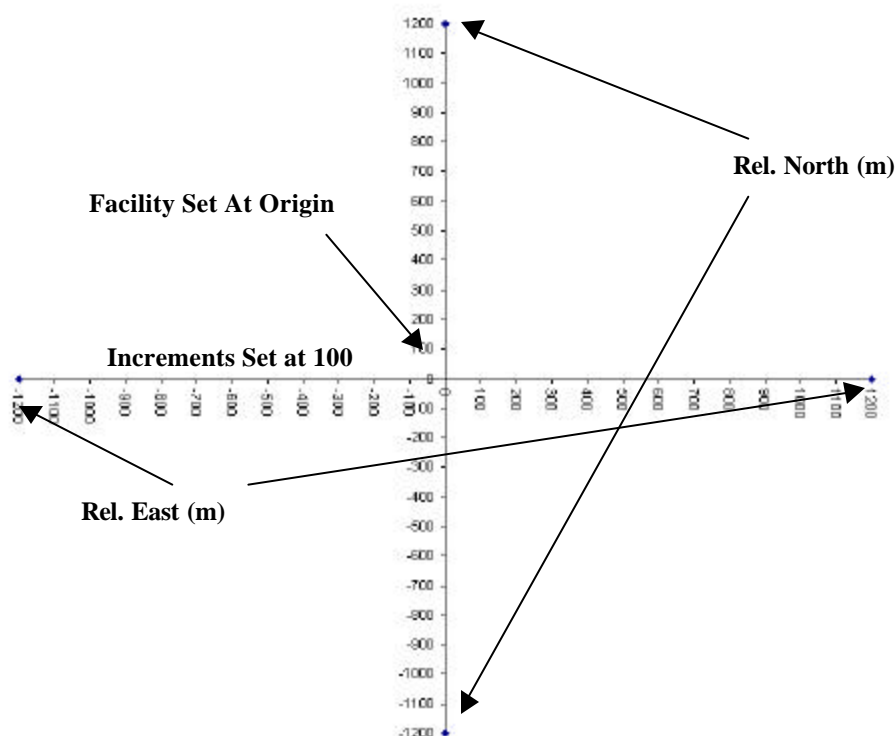
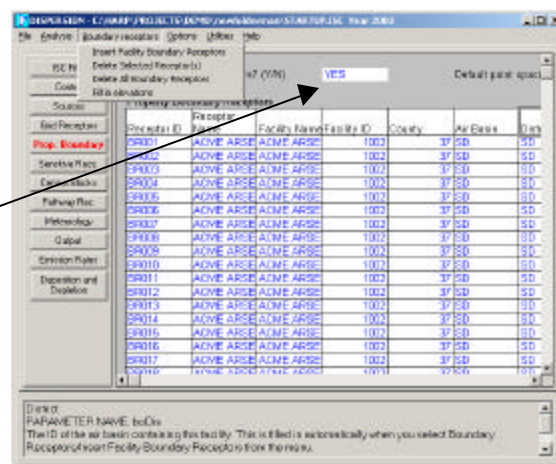


Illustration of the Grid Generation Parameter



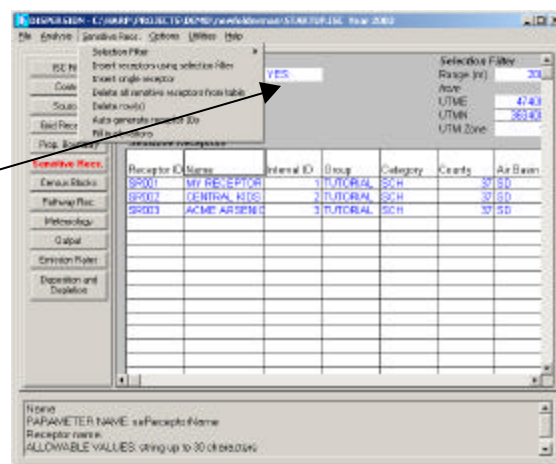
## Step 6. Defining Property Boundary Receptors

1. Property boundary receptors worksheet describes the locations of receptors on a facility property boundary. To define the receptors, start by clicking **Prop. Boundary** on the left side of the **Dispersion** screen. If you wish to exclude property boundary receptors in the dispersion analysis, type "NO" into the **Include boundary receptors** field.
2. Delete the boundary receptors from the previous workbook by clicking **Boundary receptors/Delete All Boundary Receptors** from the top menu (See Note 2).
3. Insert the property boundary receptors by clicking **Boundary receptors/Insert Facility Boundary Receptors** from the top menu. Then select a facility from the popup list.
4. Click **File/Save** from the top menu to save the file.

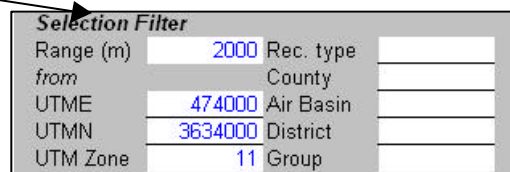


## Step 7. Defining Sensitive Receptors

1. Sensitive receptors are specific points of interest (e.g., school). To add sensitive receptors, click **Sensitive Recs.** button on the left side of the **Dispersion** screen. If you wish to exclude sensitive receptors in the dispersion analysis, type "NO" into the **Include Sensitive Receptors** field.
2. Next, delete the existing receptor data from the workbook by clicking **Sensitive Recs./Delete All Sensitive Receptors from table** (See Note 2).
3. Insert the sensitive receptors that you would like to include in this analysis by using either the selection filter at the top of the window or picking the sources individually by clicking **Sensitive Recs./Insert single receptor** (See Note 3). This will add sensitive receptors that have been entered into the CEIDARS-Lite database. Sensitive receptor data can also be entered by hand directly into the sensitive receptor worksheet.



- To use the selection filter, blank all the fields and type in the information you wish to use in your query for your receptors. Select **Sensitive Recs./Insert receptors using selection filter** from the top menu.
- HARP can automatically generate the receptor identification tags for the **Receptor ID** column. Using your mouse, highlight all cells that need identification tags. To highlight the cells, click and hold the left mouse button and drag. Then click **Sensitive Recs./Auto generate receptor IDs** from the top menu to generate source identification tags.
- Click **File/Save** from the top menu to save the file.

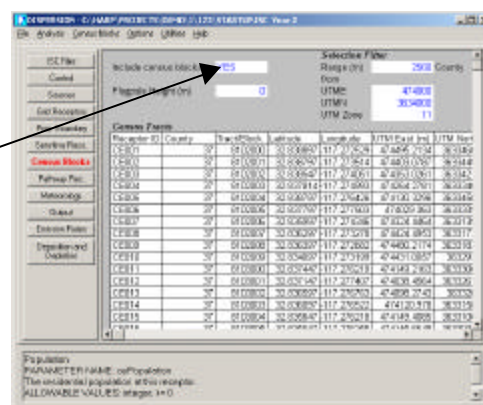


**Selection Filter**

Range (m)	2000	Rec. type	
from		County	
UTME	474000	Air Basin	
UTMN	3634000	District	
UTM Zone	11	Group	

## Step 8. Defining Census Block Receptors

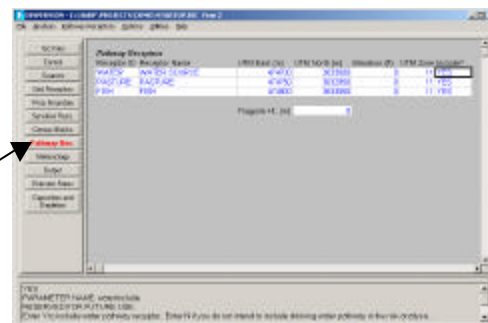
- Census block receptors will be used to calculate population exposure and cancer burden. To add census receptors, click the **Census Blocks** button on the left side of the **Dispersion** screen. If you wish to exclude census block receptors in the dispersion analysis, type "NO" into the **Include census block** field.
- Delete the receptors from the previous workbook by clicking **Census Blocks/Delete All Census Block Receptors** from the top menu (See Note 2).
- To select a set of census blocks around a facility, click **Census Blocks/Selection Filter/Set section filter to origin to facility location** from the top menu and select the facility. Enter a value into the range box. HARP will add all of the census blocks that are within this distance of the selected facility. Then click on **Census Blocks/Insert Receptors Using Selection Filter** from the top menu to import the census blocks.
- Click **File/Save** from the top menu to save the file.



The screenshot shows the HARP software interface. On the left, the 'Census Blocks' button is highlighted. In the center, a table lists census blocks with columns for Receptor ID, County, Block, Latitude, Longitude, UTM Easting, and UTM Northing. On the right, the 'Selection Filter' dialog box is open, showing fields for Range (m), Rec. type, County, UTME, UTMN, and UTM Zone. The 'Include census block' checkbox is checked.

## Step 9. Defining Pathway Receptors

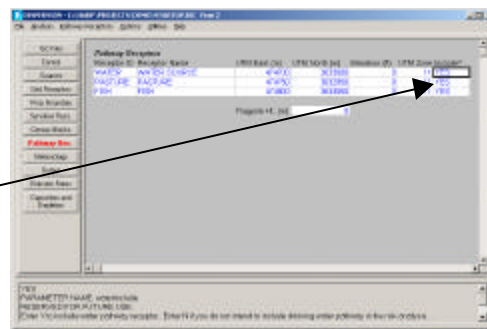
- If you need to run a multipathway risk analysis, there are three pathway receptors that may be required. Click on the **Pathway Rec.** button on the left side of the **Dispersion** screen.



The screenshot shows the HARP software interface. On the left, the 'Pathway Rec.' button is highlighted. In the center, a table lists pathway receptors with columns for Receptor Name, Receptor ID, Receptor Type, Receptor Category, Receptor Subcategory, Receptor Location, Receptor Description, and Receptor Status. On the right, the 'Pathway Receptor' dialog box is open, showing fields for Receptor Name, Receptor ID, Receptor Type, Receptor Category, Receptor Subcategory, Receptor Location, Receptor Description, and Receptor Status.



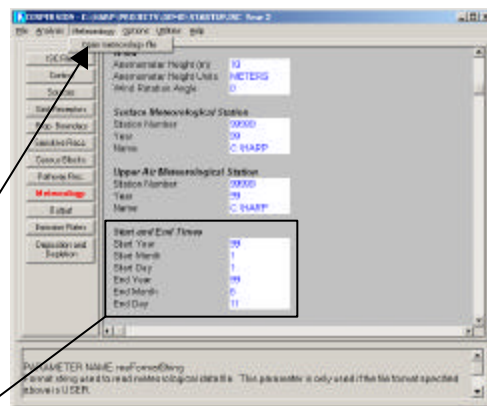
- Enter the UTM coordinates and UTM zone for the water source, pasture land, and fishing water body.
- Type "YES" into the last field of each pathway you wish to include in the multipathway risk analysis. Type "No" into the last field for pathways you do not intend to include in a multipathway risk analysis.



## Step 10. Opening the Meteorology File (Only for Representative Data)

This step is only for the representative data version of the Dispersion Analysis module from Step 1. If you chose to use the screening meteorology version of the Dispersion Analysis module proceed to Step 11, the screening meteorology file has already been loaded for you.

- Hourly meteorological data is needed to conduct a dispersion analysis. Click the **Meteorology** button on the left side of the **Dispersion** screen.
- If you chose to use the representative meteorology version of the Dispersion Analysis module in the Step 1, you must now select the meteorology file. Click **Meteorology/Open meteorology file**. Select a file.
- Finally, confirm the meteorology parameters on the **Dispersion** screen corresponds to your file. Here is where you can also change start and end dates.

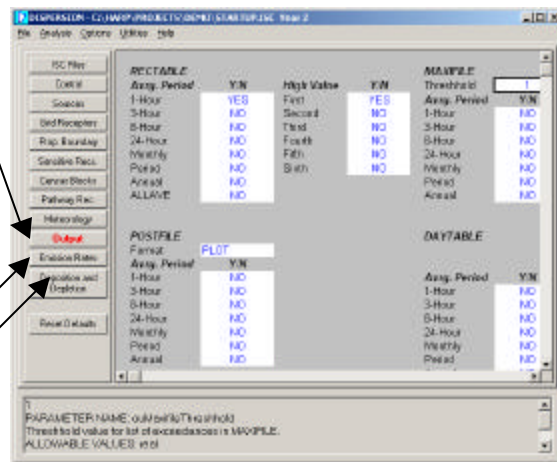


## Step 11. Checking the Output Parameters

- Click on the **Output** button on the left side of the Dispersion screen. The information in this window tells ISC how to create the output files. Most of the time you will keep the defaults.

## Step 12. Options for Advance Users

- The **Emission Rates** and **Deposition and Depletion** option is for advanced users. See the User Guide for more information.



### **Step 13. Adding Elevation Data**

You can add data from DEM files to the entire Dispersion Analysis Workbook in two steps.

1. Open DEM files by selecting, ***Files/DEM/Open File***. Browse and select the desired file.
2. Select ***Utilities/Look up all elevations*** from the menu.
3. After completing Step 1 through 13, select ***File/Save***.

### **Step 14. Building and Running ISCST3 Input**

After you have completed each worksheet you are now ready to run ISCST3. Click on ***Analysis/Build ISC3 Input and Run***. Behind the scenes HARP will run ISCST3 and BPIP. All ISCST3 input and output files will be saved to your project directory. Exit the dispersion module and return to the HARP main menu. The dispersion analysis is complete.